drop test in which the device was dropped from a height of 1m. As a result, damage such as fracture or the like did not occur to the silicon plate at all. According to this fact, it is confirmed that no problem occur even if the semiconductor device in accordance with the present embodiment is handled in the same manner as an ordinary electronic component. The semiconductor device 30 can employ an extremely thin semiconductor element, which is hardly handled when being used in a conventional resin-sealed device, because the device 30 has a simple structure in which the bumper member 4 is simply attached to the center of the semiconductor element 1' with the adhesive 50.

Referring to Fig. 13A through Fig. 13C, mounting the semiconductor device 30 will be described. As shown in Fig. 13A, the device 30, having a top surface of the bumper member 4 by a mounting head 10, is sucked and positioned above a substrate 11 by the head 10. After the device has bumps 2 aligned with respective electrodes 12 of the substrate 11, the mounting head 10 is then lowered to mount the bumps 2 of the semiconductor element 1' on the electrodes 12, respectively.

Subsequently, the substrate 11, with being heated, has the electrodes 12 bonded to the bumps 2 by soldering. As described above, the mounting head 10 holds the bumper member 4, which is the holding member, during handling to mount the semiconductor device 30 on the substrate 11. The bumps 2 may be bonded to respective electrodes 12 by a conductive resin adhesive.

In an assembly including the semiconductor device 30 mounted on the substrate 11, the device 30 is fixed to the substrate 11 through the bonding of the bumps 2 of the device 30 to the electrodes 12 of the substrate 11as a workpiece. As shown in Fig. 13C, when the substrate 11 is deformed by an external force after the mounting, only the semiconductor element 1' is

deformed in responsive to the deformation of the substrate 11 because the element 1' is thin and is easily bent. In the present embodiment, the element 1' has only the center bonded to the bumper member 4, and thus, can be deformed without being restrained by the bumper member 4.

Moreover, an extremely thin semiconductor element having a thickness of 100μm or less, upon being employed in the semiconductor device in accordance with this embodiment, accepts a reduced stress on bumps 2 due to a difference between thermal expansion coefficients of the semiconductor element 1' and substrate 11. In a conventional electronic component (semiconductor device) having a bump, since employing a thick semiconductor element, accepts an excess stress on the bump, and thus, the component may cause disconnection between the bump and an electrode of a substrate. For this reason, an underfill resin or the like is needed for reinforcement between the electronic component and the substrate. However, the extremely thin semiconductor element 1' in accordance with the present embodiment, after being bonded, reduces a stress on a junction of the semiconductor device 30 and substrate 11 without reinforcement such as the underfill resin. In addition, the semiconductor device 30 has a simple package structure including the semiconductor element 1' and the bumper member 4' simply bonded together with the adhesive 50, thus having an ensured reliability after this device 30 is mounted.

(Exemplary Embodiment 5)

Fig. 14A through Fig. 14D and Fig. 15A through Fig. 15D illustrate processes in a method of manufacturing a semiconductor device in accordance with an exemplary embodiment 5 of the present invention, and illustrate the method in order of procedure thereof.

The present embodiment is substantially the same as the embodiment 2 except the process of sticking the semiconductor elements 1' to the bumper plate 4 with an adhesive. As shown in Fig. 14D, the semiconductor elements 1' are stuck to the bumper plate 4. In this process, an adhesive 50 is applied to each portion corresponding to each element 1' on a top surface of the bumper plate 4, and a thinned semiconductor elements 1' is stuck to a surface coated with the adhesive 50. In this drawing, the adhesive 50 is applied to only the portion corresponding to a center of each semiconductor element, and is made of material having an elastic modulus lower than the bumper plate 4.

The rest of the procedure for obtaining the semiconductor devices 30 is the same as that of the embodiment 2.

(Exemplary Embodiment 6)

Fig. 16A through Fig. 16C and Fig. 17A through Fig. 17D illustrate processes in a method of manufacturing a semiconductor device in accordance with an exemplary embodiment 6 of the present invention, and illustrate the method in order of procedure thereof. Fig. 18A and Fig. 18B illustrate processes of mounting the semiconductor device.

The present embodiment is substantially the same as the embodiment 3 except the process of sticking each semiconductor element 1' to the bumper case 14 with an adhesive. The adhesive 50 is applied to only a portion of the recess portion 14b corresponding to a center of the element 1'. As shown in Fig. 17C, the element 1' is mounted at the recess portion 14b, the adhesive 50 bonds the bumper case 14 to the element 1', and consequently, a semiconductor device 35 is provided. The bumper case 14 bonded to the element 1' has an edge of a projection 14a not projecting from a tip of the bump 2 of the element 1'.